

Self-Addressable Self-Assembling
Microelectronic Systems and Devices
For Molecular Biological Analysis and Diagnostics
Abstract

5 A self-addressable, self-assembling microelectronic
device is designed and fabricated to actively carry out
and control multi-step and multiplex molecular biological
reactions in microscopic formats. These reactions include
nucleic acid hybridization, antibody/antigen reaction,
10 diagnostics, and biopolymer synthesis. The device can be
fabricated using both microlithographic and micro-
machining techniques. The device can electronically
control the transport and attachment of specific binding
entities to specific micro-locations. The specific
15 binding entities include molecular biological molecules
such as nucleic acids and polypeptides. The device can
subsequently control the transport and reaction of
analytes or reactants at the addressed specific micro-
locations. The device is able to concentrate analytes and
20 reactants, remove non-specifically bound molecules,
provide stringency control for DNA hybridization
reactions, and improve the detection of analytes. The
device can be electronically replicated.